2. An improved reactor as in claim 1, wherein the opposed electrode is mounted in an assembly having an insulating ring which is flush with the entire periphery of the exposed face, whereby the support frame is protected from exposure to the plasma.

3. An improved reactor as in claim 1, wherein the electrode plate comprises a disk.

4. An improved reactor as in claim 3, wherein the disk includes a plurality of apertures therethrough to permit the flow of a reactant gas into the space between the electrodes.

5. An improved reactor as in claim 3, wherein the support frame comprises a ring which is secured about the periphery of the disk.

6. An improved reactor as in claim 3, wherein the support frame comprises a plurality of concentric rings secured to the opposite face of the electrode disk.

7. An improved reactor as in claim 3, wherein the support frame comprises a flat plate which is secured to and covers substantially the entire opposite face of the electrode disk.

8. An improved parallel electrode reactor as in claim 5, wherein the disk as a diameter in the range from about 12 to 32 cm and a thickness in the range from about 0.1 to 2 cm.

9. An improved reactor as in claim 8, wherein the ring has an annular width in the range from about 0.5 to 5 cm and a thickness in the range from about 0.2 to 3 cm.

10. An improved reactor as in claim 1, wherein the plate is bonded to the support frame by means of a bonding layer.

11. An improved reactor as in claim 10, wherein the bonding layer is composed of a material having a low vapor pressure.

12. An improved reactor as in claim 11, wherein the bonding layer material is selected from the group consisting of indium, silver, and metal-filled epoxies.

13. An improved reactor as in claim 12, wherein the bonding layer is formed by brazing, soldering, or adhesion.

14. An improved reactor as in claim 13, wherein at least one of the plate and the support frame is metallized in the region to be bonded prior to brazing, soldering, or adhesion.

15. An improved reactor as in claim 10, wherein the bonding layer is substantially free from voids and has substantially uniform electrical and thermal conductivities through the region of bonding.

16. An improved reactor as in claim 1, wherein the electrode plate is composed of a pure material selected from the group consisting of graphite, polycrystalline silicon, quartz, glassy carbon, single crystal silicon, pyrolytic graphite, silicon carbide, alumina, zirconium, diamond-coated materials, and titanium oxides.

17. An improved reactor as in claim 1, wherein the electrically and thermally conductive material is selected from the group consisting of graphite, aluminum, copper, and stainless steel.

18. An electrode assembly comprising:

an electrode composed of a substantially pure material and having a substantially uniform thickness; and

a support ring bonded about the periphery of one face of the disk, leaving the other face substantially flat and free from protuberances, wherein the support ring is composed of an electrically and thermally conductive material

19. An electrode assembly as in claim 18, wherein the disk includes a plurality of apertures to permit gas flow therethrough.

20. An electrode assembly as in claim 18, further comprising at least one additional support ring mounted concentrically within the peripheral support ring or the one face of the disk.

21. An electrode assembly as in claim 18, wherein the support ring includes an interior plate which contacts substantially the entire one face of the disk.

22. An electrode assembly as in claim 18, wherein the disk has a diameter in the range from about 12 to 32 cm and a thickness in the range from about 0.1 to 2 cm.

23. An electrode assembly as in claim 18, wherein the ring has an annular width in the range from about 0.5 to 5 cm and a thickness in the range from about 0.2 to 3 cm.

24. An electrode assembly as in claim 18, wherein the disk is bonded to the ring by means of a bonding layer.

25. An electrode assembly as in claim 24, wherein the bonding layer is composed of a ductile metal or alloy or a metal-filled epoxy having a low vapor pressure.

26. An electrode assembly as in claim 25, wherein the ductile metal or alloy is selected from the group consisting of indium, silver, and metal-filled epoxies.

27. An electrode assembly as in claim 26, wherein the bonding layer is formed by brazing, soldering, or adhesion.

28. An electrode assembly as in claim 27, wherein at least one of the disk and the ring is metallized in the region to be bonded prior to brazing, soldering, or adhesion.

29. An electrode assembly as in claim 24, wherein the bonding layer is substantially free from voids and has substantially uniform electrical and thermal conductivities through the region of bonding.

30. An electrode assembly as in claim 18, wherein the material is selected from the group consisting of graphite, polycrystalline silicon, quartz, glassy carbon, single crystal silicon, pyrolytic graphite, silicon carbide, alumina, zirconium, diamond-coated materials, and titanium oxides.

31. An electrode assembly as in claim 18, wherein the electrically and thermally conductive material is selected from the group consisting of graphite, aluminum, copper, and stainless steel.

32. An electrode assembly as in claim 18, wherein the support ring is pre-stressed to impart a radially inward compression on the electrode disk.

33. A method for forming an electrode assembly including a support ring and an electrode plate, said method comprising:

bonding the support ring about the periphery of the electrode plate at elevated temperature, wherein the material of the electrode plate has a higher coefficient of thermal expansion than that of the electrode plate; and

allowing the bonded assembly to return to room temperature, whereby the differential contraction imparts the desired stress.

34. A method as in claim 33, wherein the elevated temperature is chosen to be above an expected operating temperature of the electrode assembly.

35. A method as in claim 33, wherein the electrode plate is formed from a substantially pure material selected from the group consisting of graphite, polycrystalline silicon, quartz, glassy carbon, single crystal silicon, pyrolytic graphite, silicon carbide, alumina, zirconium, diamond-coated materials, and titanium oxides.

36. An electrode assembly formed by the method of claim 33.

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